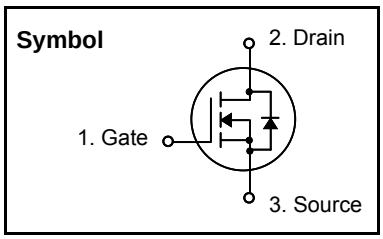
PRELIMINARY

SFH054

N-Channel MOSFET

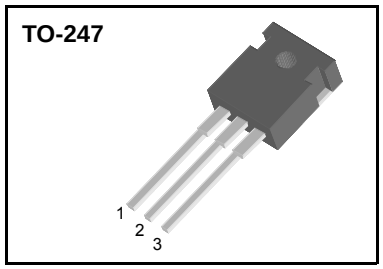
Features

- Low R_{DS}(on) (0.014Ω)@V_{GS}=10V
- Low Gate Charge (Typical 70nC)
- Low Crss (Typical 160pF)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Maximum Junction Temperature Range (175°C)



General Description

This Power MOSFET is produced using SemiWell's advanced planar stripe, DMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a low gate charge with superior switching performance, and rugged avalanche characteristics. This Power MOSFET is well suited for synchronous DC-DC Converters and Power Management in portable and battery operated products.



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain to Source Voltage	60	V
I_D	Continuous Drain Current(@T_C = 25°C)	70*	A
	Continuous Drain Current(@T_C = 100°C)	64	A
I_{DM}	Drain Current Pulsed (Note 1)	360	A
V_{GS}	Gate to Source Voltage	±25	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	800	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	7.0	V/ns
P_D	Total Power Dissipation(@T_C = 25 °C)	230	W
	Derating Factor above 25 °C	1.5	W/°C
T_{STG}, T_J	Operating Junction Temperature & Storage Temperature	- 55 ~ 175	°C
T_L	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.	300	°C

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min.	Typ.	Max.	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	-	0.65	°C/W
$R_{\theta CS}$	Thermal Resistance, Case to Sink	-	0.24	-	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	-	40	°C/W

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Electrical Characteristics (T_C = 25 °C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250uA	60	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature coefficient	I_D = 1mA, referenced to 25 °C	-	0.056	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60V, V_{GS} = 0V	-	-	1	uA
		V_{DS} = 48V, T_C = 150 °C	-	-	10	uA
I_{GSS}	Gate-Source Leakage, Forward	V_{GS} = 25V, V_{DS} = 0V			100	nA
	Gate-Source Leakage, Reverse	V_{GS} = -25V, V_{DS} = 0V	-	-	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250uA	2.0	-	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-state Resistance	V_{GS} =10 V, I_D = 35A	-	-	0.014	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} =0 V, V_{DS} =25V, f = 1MHz	-	2350	3050	pF
C_{oss}	Output Capacitance		-	690	890	
C_{rss}	Reverse Transfer Capacitance		-	160	200	
Dynamic Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD} =30V, I_D =35A, R_G =50Ω ※ **see fig. 13.** (Note 4, 5)	-	30	70	ns
t_r	Rise Time		-	60	130	
$t_{d(off)}$	Turn-off Delay Time		-	125	260	
t_f	Fall Time		-	95	200	
Q_g	Total Gate Charge	V_{DS} =48V, V_{GS} =10V, I_D =70A ※ **see fig. 12.** (Note 4, 5)	-	70	90	nC
Q_{gs}	Gate-Source Charge		-	18	-	
Q_{gd}	Gate-Drain Charge(Miller Charge)		-	24	-	

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
I_S	Continuous Source Current	Integral Reverse p-n Junction Diode in the MOSFET	-	-	70	A
I_{SM}	Pulsed Source Current		-	-	360	
V_{SD}	Diode Forward Voltage	I_S =70A, V_{GS} =0V	-	-	1.5	V
t_{rr}	Reverse Recovery Time	I_S=70A,V_{GS}=0V,dI_F/dt=100A/us	-	62	-	ns
Q_{rr}	Reverse Recovery Charge		-	110	-	nC

※ NOTES
1. Repeativity rating : pulse width limited by junction temperature
2. L = 250 uH, I_{AS} = 70A, V_{DD} = 25V, R_G = 0Ω , Starting T_J = 25°C
3. ISD ≤ 70A, di/dt ≤ 300A/us, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse Width ≤ 300us, Duty Cycle ≤ 2%
5. Essentially independent of operating temperature.

* Current limited by package,(Die Current=90A)

Fig 1. On-State Characteristics

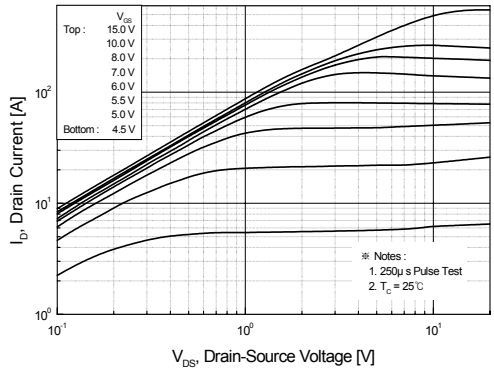


Fig 2. Transfer Characteristics

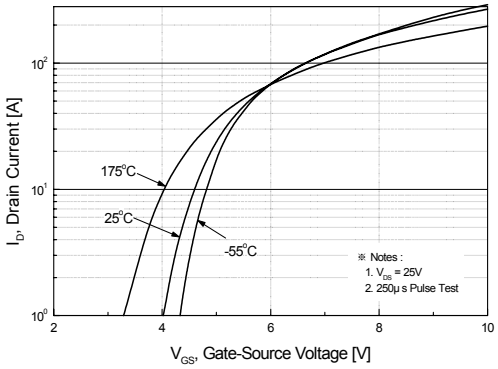


Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage

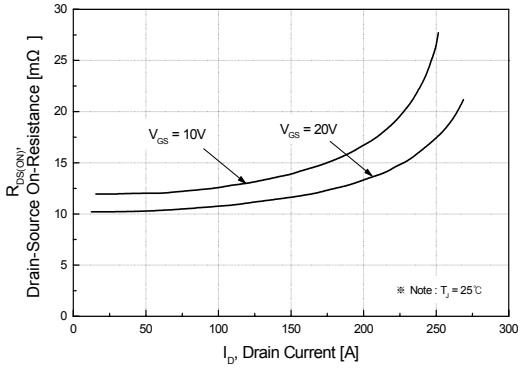


Fig 4. On State Current vs. Allowable Case Temperature

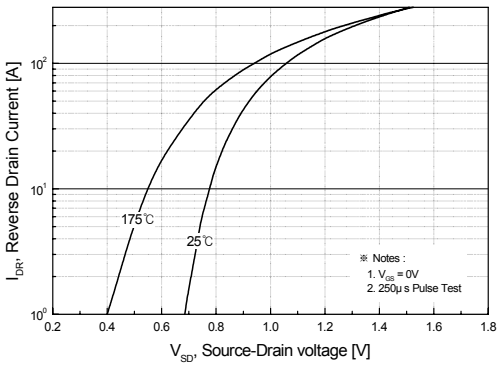


Fig 5. Capacitance Characteristics

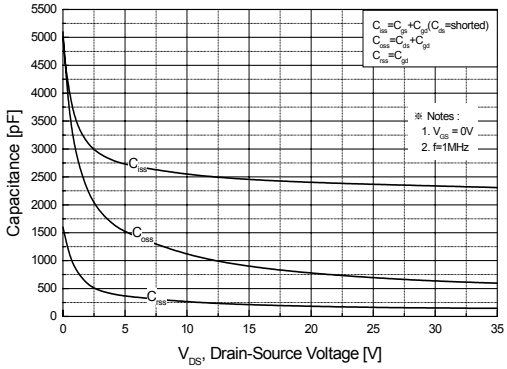


Fig 6. Gate Charge Characteristics

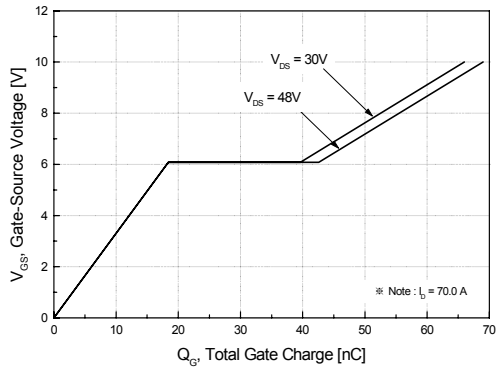


Fig 7. Breakdown Voltage Variation vs. Junction Temperature

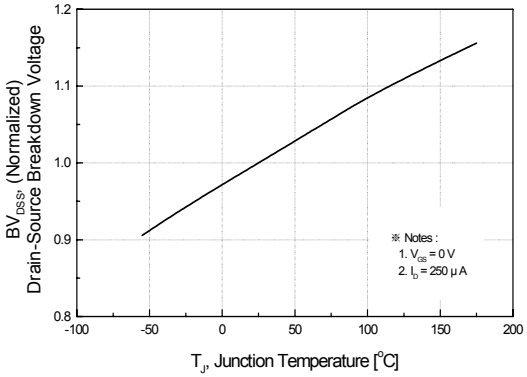


Fig 8. On-Resistance Variation vs. Junction Temperature

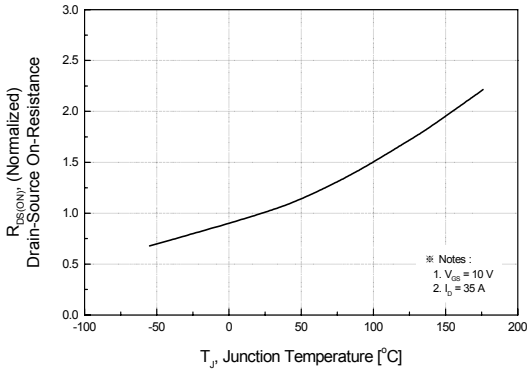


Fig 9. Maximum Safe Operating Area

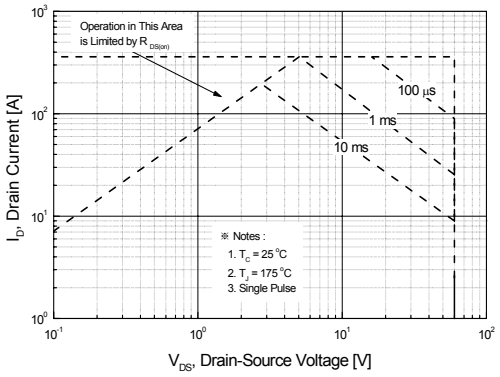


Fig 10. Maximum Drain Current vs. Case Temperature

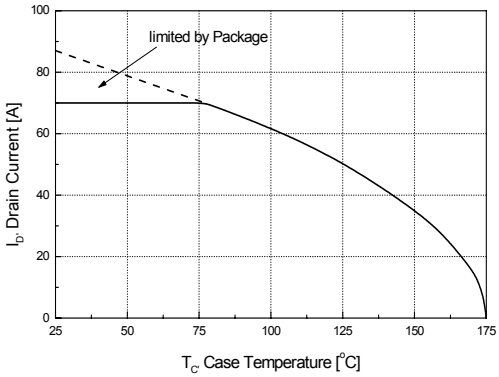


Fig 11. Transient Thermal Response Curve

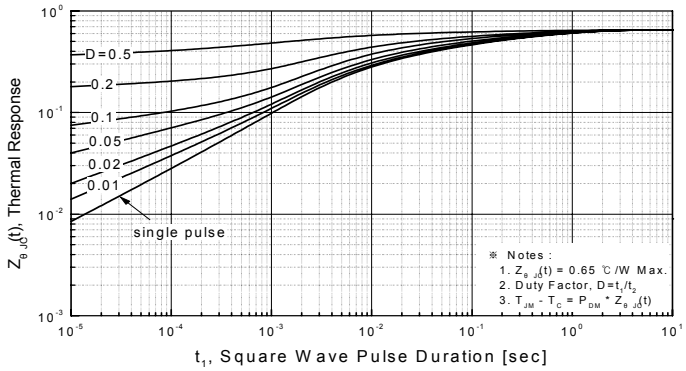


Fig. 12. Gate Charge Test Circuit & Waveforms

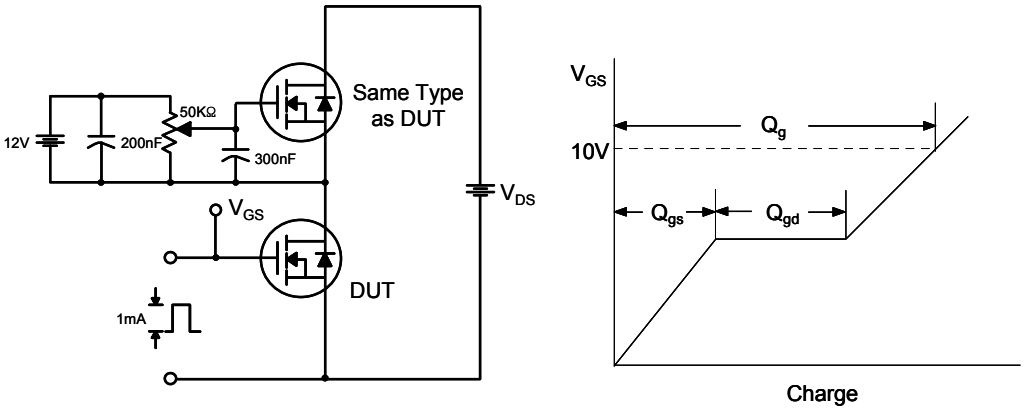


Fig 13. Switching Time Test Circuit & Waveforms

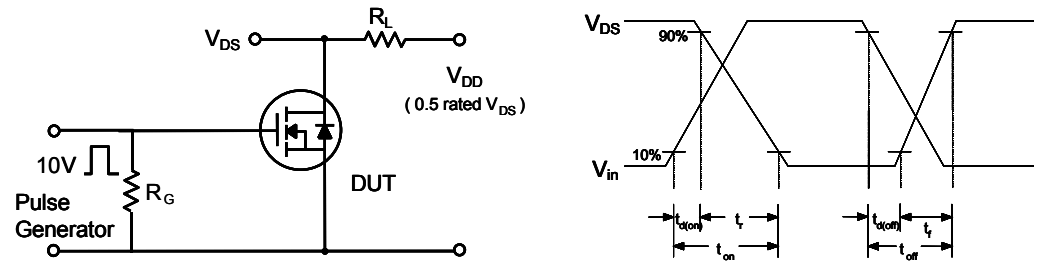


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

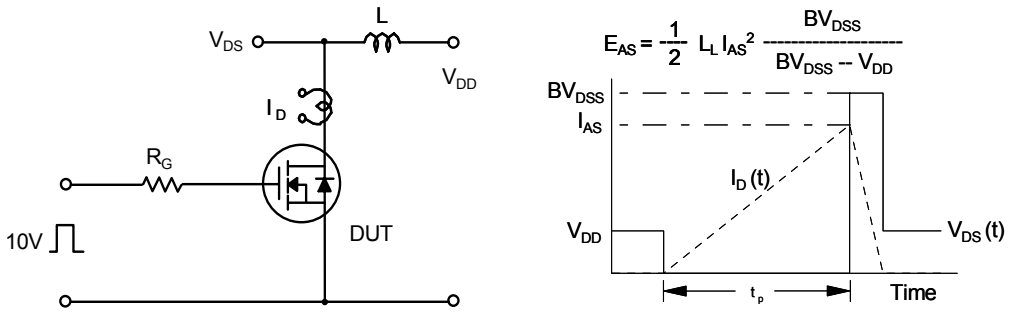
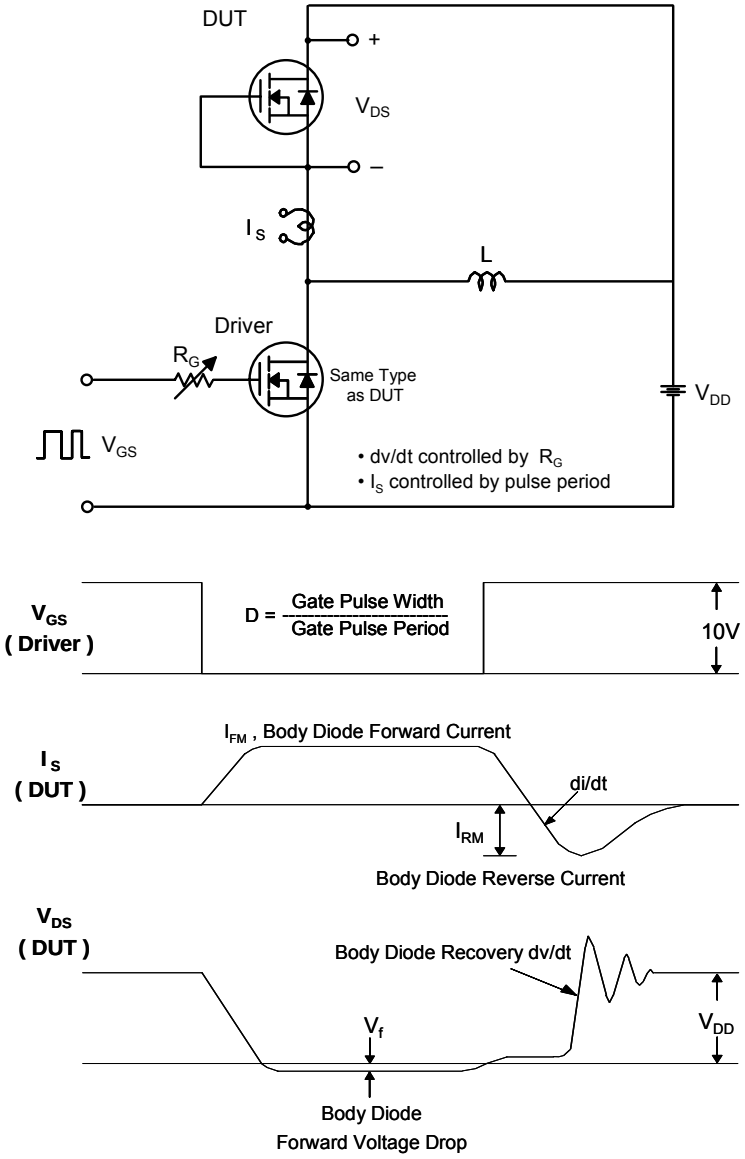


Fig. 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO-247 Package Dimension

Dim.	mm			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.77		16.03	0.621		0.631
B	20.80		21.10	0.819		0.831
C	20.05		20.31	0.789		0.800
D	4.48		4.58	0.176		0.180
E	4.27		4.37	0.168		0.172
F	5.32		5.58	0.209		0.220
G	4.90		5.16	0.193		0.203
H	1.90		2.06	0.075		0.081
I	2.35		2.45	0.093		0.096
J		0.6			0.024	
K	1.2		1.33	0.047		0.052
L	1.07		1.33	0.042		0.052
M	2.99		3.25	0.118		0.128
ϕ	3.56		3.66	0.140		0.144

